IN THE CLAIMS:

Please amend the claims as follows:

1. (Previously Presented) An instrument for performing measurement on an object, the instrument comprising:

a radiation source for generating a beam of radiation, the radiation source comprising (i) a cold cathode, comprising a carbon nanotube material, for emitting electrons and (ii) a target, in a path of the electrons emitted by the cold cathode, for emitting the beam of radiation when struck by the electrons, the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized; and

a detector, disposed to intercept the beam of radiation after the beam of radiation has been made incident on the object, for detecting the beam of radiation and for outputting a signal representing the beam of radiation.

2. (Original) The instrument of claim 1, further comprising a computing device for receiving the signal and for calculating and outputting, in accordance with the signal, a numerical value representing a property of the object.

3. (Original) The instrument of claim 2, wherein the property comprises thickness.

4. (Original) The instrument of claim 2, wherein the property comprises mass per unit area.

5. (Original) The instrument of claim 2, wherein the computing device is connected to the radiation source to control the radiation source and is programmed to modulate the beam of radiation.

6. (Original) The instrument of claim 5, wherein the computing device is programmed to modulate the beam of radiation and to analyze the signal, to achieve phase-locked detection.

7. (Original) The instrument of claim 6, wherein the beam of radiation comprises soft x-rays.

8. (Original) The instrument of claim 5, wherein the computing device is programmed (i) to modulate the beam of radiation by turning the beam of radiation off and then on while the instrument operates, (ii) to determine, from the signal received while the beam of radiation is off, a leakage current of the detector, and (iii) to calibrate the detector in accordance with the leakage current.

9. (Original) The instrument of claim 1, wherein the radiation source and the detector are positioned relative to each other such that the detector receives the beam of radiation after the beam of radiation has been transmitted through the object.

10. (Original) The instrument of claim 1, wherein the radiation source and the detector are positioned relative to each other such that the detector receives the beam of radiation after the beam of radiation has been backscattered from the object.

11. (Original) The instrument of claim 1, wherein the radiation source and the detector are positioned relative to each other such that the detector receives the beam of radiation after the beam of radiation has been side-scattered from the object.

12. (Original) The instrument of claim 1, wherein the detector comprises:

a first detector which is positioned relative to the radiation source such that the first detector receives a first portion of the beam of radiation after the first portion of the beam of radiation has been transmitted through the object; and

a second detector which is positioned relative to the radiation source such that the second detector receives a second portion of the beam of radiation after the second portion of the beam of radiation has been side-scattered through the object.

13. (Previously Presented) An instrument for performing measurement on an object, the instrument comprising:

a radiation source for generating a beam of radiation, the radiation source comprising (i) a cold cathode, comprising a carbon nanotube material, for emitting electrons and (ii) a target, in a path of the electrons emitted by the cold cathode, for emitting the beam of radiation when struck by the electrons, the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized;

a detector, disposed to intercept the beam of radiation after the beam of radiation has been made incident on the object, for detecting the beam of radiation and for outputting a signal representing the beam of radiation; and

a computing device for receiving the signal and for calculating and outputting, in accordance with the signal, a numerical value representing a property of the object, wherein the computing device is connected to the radiation source to control the radiation source and is programmed to modulate the beam of radiation.

14. (Original) The instrument of claim 13, wherein the computing device is programmed to modulate the beam of radiation and to analyze the signal, to achieve phase-locked detection.

15. (Original) The instrument of claim 14, wherein the beam of radiation comprises soft x-rays.

16. (Original) The instrument of claim 13, wherein the radiation source and the detector are positioned relative to each other such that the detector receives the beam of radiation after the beam of radiation has been transmitted through the object.

17. (Original) The instrument of claim 13, wherein the radiation source and the detector are positioned relative to each other such that the detector receives the beam of radiation after the beam of radiation has been backscattered from the object.

18. (Original) The instrument of claim 13, wherein the radiation source and the detector are positioned relative to each other such that the detector receives the beam of radiation after the beam of radiation has been side-scattered from the object.

19. (Original) The instrument of claim 13, wherein the detector comprises:

a first detector which is positioned relative to the radiation source such that the first detector receives a first portion of the beam of radiation after the first portion of the beam of radiation has been transmitted through the object; and

a second detector which is positioned relative to the radiation source such that the second detector receives a second portion of the beam of radiation after the second portion of the beam of radiation has been side-scattered through the object.

20. (Previously Presented) An instrument for performing measurement on a sheet of material, the instrument comprising:

a radiation source for generating a beam of radiation, the radiation source comprising (i) a cold cathode, comprising a carbon nanotube material, for emitting electrons and (ii) a target, in a path of the electrons emitted by the cold cathode, for emitting the beam of radiation when struck by the electrons, the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized;

a roller assembly for moving the sheet of material such that the beam of radiation is incident on the sheet of material and such that the sheet of material moves past the source; and

a detector, disposed to intercept the beam of radiation after the beam of radiation has been made incident on the sheet of material, for detecting the beam of radiation and for outputting a signal representing the beam of radiation.

21. (Original) The instrument of claim 20, wherein the source and the detector are disposed to be on opposite sides of the sheet of material, such that the beam of radiation is transmitted through the sheet of material.

22. (Original) The instrument of claim 21, further comprising a computing device for receiving the signal and for calculating and outputting, in accordance with the signal, a numerical value representing a property of the object.

23. (Original) The instrument of claim 22, wherein the property comprises thickness.

24. (Original) The instrument of claim 22, wherein the property comprises mass per unit area.

25. (Original) The instrument of claim 20, wherein the computing device is connected to the radiation source to control the radiation source and is programmed to modulate the beam of radiation.

26. (Original) The instrument of claim 25, wherein the computing device is programmed to modulate the beam of radiation and to analyze the signal, to achieve phase-locked detection.

27. (Original) The instrument of claim 26, wherein the beam of radiation comprises soft x-rays.

28. (Original) The instrument of claim 22, wherein the detector is a solid state detector.

29. (Original) The instrument of claim 28, wherein the computing device is programmed (i) to modulate the beam of radiation by turning the beam of radiation off and then on while the instrument operates, (ii) to determine, from the signal received while the beam of radiation is off,

a leakage current of the detector, and (iii) to calibrate the detector in accordance with the leakage current.

30. (Previously Presented) An instrument for performing measurement on a rod-shaped object, the instrument comprising:

a radiation source for generating a beam of radiation, the radiation source comprising (i) a cold cathode, comprising a carbon nanotube material, for emitting electrons and (ii) a target, in a path of the electrons emitted by the cold cathode, for emitting the beam of radiation when struck by the electrons, the cold cathode being controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized;

a holder for holding the rod-shaped object in a path of the beam of radiation; and

a detector, disposed to intercept the beam of radiation after the beam of radiation has been made incident on the object, for detecting the beam of radiation and for outputting a signal representing the beam of radiation.

31. (Original) The instrument of claim 30, wherein the detector comprises:

a first detector which is positioned relative to the radiation source such that the first detector receives a first portion of the beam of radiation after the first portion of the beam of radiation has been transmitted through the object; and

a second detector which is positioned relative to the radiation source such that the second detector receives a second portion of the beam of radiation after the second portion of the beam of radiation has been side-scattered through the object.

32. (Original) The instrument of claim 31, wherein each of the first detector and the second detector is a solid state detector.

33. (Previously Presented) A method for performing measurement on an object, the method comprising:

(a) generating a beam of radiation by emitting electrons from a carbon nanotube material, causing the electrons to be incident on a target and emitting the beam of radiation from the target;

(b) causing the beam of radiation to be incident on the object;

(c) detecting the beam of radiation using a solid state detector and outputting a signal; and

(d) performing the measurement on the object in accordance with the signal to determine a property of the object;

wherein step (a) comprises controlling the carbon nanotube material to emit the electrons such that the beam of radiation emitted by the target is stabilized.

34. (Original) The method of claim 33, wherein the property comprises thickness.

35. (Original) The method of claim 33, wherein the property comprises mass per unit area.

36. (Previously Presented) The method of claim 33, wherein step (a) comprises modulating the beam of radiation.

37. (Original) The method of claim 36, wherein step (a) comprises modulating the beam of radiation and analyzing the signal, to achieve phase-locked detection.

38. (Original) The method of claim 37, wherein the beam of radiation comprises soft x-rays.

39. (Previously Presented) The method of claim 36, wherein step (a) comprises (i) modulating the beam of radiation by turning the beam of radiation off and then on while the

instrument operates, (ii) determining, from the signal received while the beam of radiation is off, a leakage current of the detector, and (iii) calibrating the detector in accordance with the leakage current.

40. (Original) The method of claim 33, wherein step (c) comprises receiving the beam of radiation after the beam of radiation has been transmitted through the object.

41. (Original) The method of claim 33, wherein step (c) comprises receiving the beam of radiation after the beam of radiation has been backscattered from the object.

42. (Original) The method of claim 33, wherein step (c) comprises receiving the beam of radiation after the beam of radiation has been side-scattered from the object.

43. (Original) The method of claim 33, wherein step (c) comprises:

receiving a first portion of the beam of radiation after the first portion of the beam of radiation has been transmitted through the object; and

receiving a second portion of the beam of radiation after the second portion of the beam of radiation has been side-scattered through the object.

44. (Original) The method of claim 33, wherein the object comprises a sheet material.

45. (Original) The method of claim 44, wherein the sheet material comprises paper.

46. (Original) The method of claim 45, wherein the paper is cigarette paper.

47. (Original) The method of claim 33, wherein the object comprises a rod.

48. (Original) The method of claim 47, wherein the rod is a cigarette rod.

49. (Previously Presented) A method for performing measurement on an object, the method comprising:

(a) generating a beam of radiation by emitting electrons from a carbon nanotube material, causing the electrons to be incident on a target and emitting the beam of radiation from the target;

(b) causing the beam of radiation to be incident on the object;

(c) detecting the beam of radiation and outputting a signal representing the beam of radiation; and

(d) receiving the signal and calculating and outputting, in accordance with the signal, a numerical value representing a property of the object;

wherein step (a) comprises modulating and controlling the beam of radiation such that the beam of radiation emitted by the target is stabilized.

50. (Original) The method of claim 49, wherein step (a) comprises modulating the beam of radiation and analyzing the signal, to achieve phase-locked detection.

51. (Original) The method of claim 50, wherein the beam of radiation comprises soft x-rays.

52. (Original) The method of claim 49, wherein step (c) comprises receiving the beam of radiation after the beam of radiation has been transmitted through the object.

53. (Original) The method of claim 49, wherein step (c) comprises receiving the beam of radiation after the beam of radiation has been backscattered from the object.

54. (Original) The method of claim 49, wherein step (c) comprises receiving the beam of radiation after the beam of radiation has been side-scattered from the object.

55. (Original) The method of claim 49, wherein step (c) comprises:

receiving a first portion of the beam of radiation after the first portion of the beam of radiation has been transmitted through the object; and

receiving a second portion of the beam of radiation after the second portion of the beam of radiation has been side-scattered through the object.

56. (Original) The method of claim 49, wherein the object comprises a sheet material.

57. (Original) The method of claim 56, wherein the sheet material comprises paper.

58. (Original) The method of claim 57, wherein the paper is cigarette paper.

59. (Original) The method of claim 49, wherein the object comprises a rod.

60. (Original) The method of claim 59, wherein the rod is a cigarette rod.

61. (Previously Presented) A method for performing measurement on a sheet of material, the method comprising:

(a) generating a beam of radiation by emitting electrons from a carbon nanotube material, causing the electrons to be incident on a target and emitting the beam of radiation from the target;

(b) moving the sheet of material such that the beam of radiation is incident on the sheet of material and such that the sheet of material moves past the target;

(c) detecting the beam of radiation and outputting a signal representing the beam of radiation; and

(d) receiving the signal and calculating and outputting, in accordance with the signal, a numerical value representing a property of the sheet of material;

wherein step (a) comprises controlling the carbon nanotube material to emit the electrons such that the beam of radiation emitted by the target is stabilized.

62. (Original) The method of claim 61, wherein step (c) comprises detecting the beam of radiation after the beam of radiation is transmitted through the sheet of material.

63. (Original) The method of claim 61, wherein the property comprises thickness.

64. (Original) The method of claim 61, wherein the property comprises mass per unit area.

65. (Original) The method of claim 61, wherein step (a) comprises modulating the beam of radiation.

66. (Previously Presented) The method of claim 65, wherein step (a) comprises modulating the beam of radiation and analyzing the signal, to achieve phase-locked detection.

67. (Previously Presented) The method of claim 66, wherein the beam of radiation comprises soft x-rays.

68. (Original) The method of claim 61, wherein step (c) is performed using a solid state detector.

69. (Previously Presented) The method of claim 68, wherein step (a) comprises (i) modulating the beam of radiation by turning the beam of radiation off and then on while the instrument operates, (ii) determining, from the signal received while the beam of radiation is off, a leakage current of the detector, and (iii) calibrating the detector in accordance with the leakage current.

70. (Previously Presented) The method of claim 68, wherein the sheet of material comprises paper.

71. (Previously Presented) The method of claim 70, wherein the paper is cigarette paper.

72. (Previously Presented) A method for performing measurement on a rod-shaped object, the method comprising:

(a) generating a beam of radiation by emitting electrons from a carbon nanotube material, causing the electrons to be incident on a target and emitting the beam of radiation from the target;

(b) holding the rod-shaped object in a path of the beam of radiation;

(c) detecting the beam of radiation and outputting a signal representing the beam of radiation; and

(d) determining, from the signal, a property of the rod-shaped object;

wherein step (a) comprises controlling the carbon nanotube material to emit the electrons such that the beam of radiation emitted by the target is stabilized.

73. (Previously Presented) The method of claim 72, wherein step (c) comprises:

detecting a first portion of the beam of radiation by using a first detector after the first portion of the beam of radiation has been transmitted through the object; and

detecting a second portion of the beam of radiation by using a second detector after the second portion of the beam of radiation has been side-scattered through the object.

74. (Previously Presented) The method of claim 73, wherein each of the first detector and the second detector is a solid state detector.

75. (Previously Presented) The method of claim 72, wherein the rod-shaped object is a cigarette rod.

76. (Currently Amended) A method for emitting a high-voltage electron beam, the method comprising:

(a) emitting electrons from a carbon nanotube cathode; and

(b) accelerating the electrons through magnetic induction to form the high-voltage electron beam;

the carbon nanotube cathode being controlled to emit the electrons such that the high-voltage electron beam is stabilized.

77. (Previously Presented) The method of claim 76, wherein step (b) comprises:

(i) causing the electrons to enter a region of a magnetic field; and

(ii) increasing the magnetic field to cause the electrons to gain energy.

78. (Previously Presented) A device for emitting a high-voltage electron beam, the device comprising:

a carbon nanotube cathode for emitting electrons; and

a magnetic field applying device for applying a magnetic field to the electrons to accelerate the electrons through magnetic induction to form the high-voltage electron beam;

the cold cathode being controlled to emit the electrons such that the high-voltage electron beam is stabilized.

79. (Previously Presented) The device of claim 78, wherein the magnetic field applying device comprises a controller for increasing the magnetic field to cause the electrons to gain energy.

80. (Previously Presented) A method for emitting a beam of radiation, the method comprising:

(a) emitting electrons from a cathode comprising a carbon nanotube material; and

(b) causing the electrons to be incident on a target for emitting the beam of radiation when struck by the electrons;

wherein the target or an intervening layer is selected to narrow a range of output energies of the beam of radiation; and

wherein the cathode is controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized.

81. (Previously Presented) The method of claim 80, wherein the beam of radiation is made incident on an object to make a stabilized measurement of a characteristic of the object.

82. (Previously Presented) The method of claim 80, wherein the beam of radiation is made incident on an object, and wherein the range of output energies is selected to select a fluorescence emission of a material in the object.

83. (Previously Presented) The method of claim 80, wherein the beam of radiation is made incident on an object, backscattered radiation from the object is detected, and the range of output energies is used to distinguish the backscattered radiation from spurious radiation.

84. (Previously Presented) The method of claim 83, wherein the object comprises a substrate with a coating on the substrate, and wherein the backscattered radiation from the object is detected to measure the coating.

85. (Previously Presented) The method of claim 84, wherein the coating comprises paint.

86. (Previously Presented) A method for detection of an object comprising a first material and concealed in a second material, the method comprising:

(a) generating a beam of radiation by emitting electrons from a carbon nanotube material, causing the electrons to be incident on a target and emitting the beam of radiation from the target;

(b) causing the beam of radiation to be incident on the object to generate Compton backscattered radiation;

(c) detecting the Compton backscattered radiation using a solid state detector and outputting a signal; and

(d) detecting the object in accordance with the signal;

wherein the carbon nanotube material is controlled to emit the electrons such that the beam of radiation emitted by the target is stabilized.

87. (Previously Presented) The method of claim 86, wherein step (d) is performed in accordance with differences in atomic weights between the first material and the second material.

88. (Previously Presented) The method of claim 87, wherein the first material comprises an explosive material.

89. (Previously Presented) The method of claim 88, wherein the second material comprises soil.

90. (Previously Presented) The method of claim 88, wherein the second material comprises a sea bed.

91. (Previously Presented) The method of claim 87, wherein the first material comprises metal.

92. (Previously Presented) The method of claim 91, wherein the second material comprises cement.

93. (Previously Presented) The method of claim 92, wherein the object is a reinforcing rod in a cement structure.

94. (Previously Presented) The method of claim 91, wherein the object is a metal shaving in a food product.

95. (Previously Presented) The instrument of claim 1, wherein the detector comprises a solid state detector.